

**Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of:)	
)	
Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of)	WT Docket No. 10-4
The Commission's Rules to Improve Wireless)	
Coverage Through the Use of Signal Boosters)	
_____)	

COMMENTS OF VERIZON

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I. INTRODUCTION AND SUMMARY.

The Commission's 2013 Consumer Signal Booster rules have proved to be a success story in enhancing wireless service for thousands of consumers.² This framework, based on technical rules developed jointly by wireless licensees and booster manufacturers, has worked as intended to improve coverage for wireless customers while protecting wireless networks from interference. In considering the proposals in the *Second FNPRM*, the Commission should modify these rules only if it can expand the benefits of the Consumer Signal Booster regime while continuing to protect wireless networks and their customers from harmful interference.³

The success of the current regulatory framework depends on two critical features, both of which were designed to protect wireless networks from harmful interference: a "Network Protection Standard" (NPS) that incorporates technical requirements for the design of Consumer

¹ In addition to Verizon Wireless, the Verizon companies participating in this filing are the regulated, wholly-owned subsidiaries of Verizon Communications Inc.

² See *Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage through the Use of Signal Boosters*, Report and Order, 28 FCC Rcd 1663 (2013) ("*2013 Report and Order*").

³ See *Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage through the Use of Signal Boosters*, Second Report and Order and Second Further Notice of Proposed Rulemaking, WT Docket No. 10-4, FCC 18-35 (Mar. 23, 2018) ("*Second Report and Order*" or "*Second FNPRM*" as appropriate).

Signal Boosters to ensure they do not interfere with wireless networks, and licensee “control,” by means of a registration system that enables wireless licensees both to approve boosters and to locate them in case of harmful interference. As the Commission observes, record evidence indicates that these rules have functioned well to facilitate consumer use of boosters while eliminating the interference problems associated with boosters prior to adoption of the rules.⁴

The Commission must be careful to expand the Consumer Signal Booster regime only in ways that do not undercut the success of the current framework; in particular, any new rules must ensure that wireless licensees maintain control of Consumer Signal Boosters. On the one hand, the proposal to allow the operation of boosters on additional spectrum bands may benefit consumers without affecting licensee control. But, on the other hand, the proposals to encourage proliferation of Embedded and Wideband signal boosters may jeopardize the ability of licensees to exert the control necessary to protect and defend their networks from harmful interference.

The Commission should therefore strengthen proposals related to labeling and registration of Embedded and Wideband Signal Boosters. As the Commission recognized when it adopted the Consumer Signal Booster rules, labeling and registration are integral components of the signal booster rules necessary to reflect licensee control, ensure that manufacturers and consumers comply with the NPS, and allow wireless providers to identify and remedy the source of harmful interference. Strengthening the labeling and registration requirements can help ensure that consumers use Embedded and Wideband Boosters without jeopardizing the current successful framework.

⁴ *Second Report and Order and Second FNPRM*, Background, ¶ 8.

II. THE COMMISSION SHOULD EXTEND THE CONSUMER SIGNAL BOOSTER RULES TO OTHER SPECTRUM BANDS ONLY THROUGH NOTICE-AND-COMMENT RULEMAKING PROCEEDINGS.

Verizon supports extending the Consumer Signal Booster rules to additional spectrum bands, as long as the specific band can work in harmony with the current NPS paradigm. The Commission proposes to allow operation on additional spectrum below 5 GHz, including 600 MHz (617-652/663-698 MHz), WCS (2305-2320/2345-2360 MHz), and BRS/EBS (2495-2690 MHz).⁵ Verizon has no objection to modifying the Consumer Signal Booster rules to include 600 MHz, WCS, and BRS/EBS because the current NPS is sufficient to ensure safe operations in those bands.

If the Commission considers the addition of other bands in the future, however, it should do so only through notice-and-comment rulemaking such as the *Second FNPRM*, rather than a process that “avoids the need for additional, future rulemakings.”⁶ The framework for Consumer Signal Boosters has succeeded in making boosters accessible to consumers because the NPS requirements are sufficiently constrained to prevent harmful interference to networks and consumer devices. Failure to offer the opportunity to consider fully whether the authorized uses in a new spectrum band are compatible with the use of signal boosters and the existing NPS could result in harmful interference into authorized users in the proposed band.

Notice-and-comment rulemaking procedures will ensure that the Commission receives input from important stakeholders on these issues. The NPS was primarily an industry-driven proposal.⁷ “[K]ey industry stakeholders worked collaboratively to develop an industry-driven proposal for regulating consumer-targeted signal boosters, which incorporates and builds upon

⁵ See *Second FNPRM* ¶ 24.

⁶ *Id.* ¶ 19.

⁷ See *2013 Report and Order* ¶¶ 53-55.

the Commission’s proposal.”⁸ By bringing together manufacturers and wireless providers, the industry was able to define technical safeguards vital “to the development of signal boosters that significantly expand coverage for consumers and do not harm wireless networks.”⁹ The Commission should continue to rely on the collaborative expertise of the various participants in the wireless industry through open rulemaking proceedings, rather than attempting to predict now how to incorporate future developments in wireless technology into its booster regulations.

The current framework also requires that licensees recognize the benefit of additional bands and so consent to customer use of signal boosters on the licensed spectrum.¹⁰ A rulemaking allows spectrum licensees to voice concerns prior to manufacturers loading new spectrum bands onto Consumer Signal Boosters. The NPS was designed to operate with equipment using broad beam-width applications, such as the Cellular Service, AWS, and 700 MHz. The design of equipment operating on millimeter wave spectrum (mmW), for example, is different.

Applications using mmW spectrum rely on both very high antenna gain (narrow directional beams) for adequate link budgets and also adaptive processing through beamforming arrays that steer the narrow beams to capture the best rays to reduce interference. The propagation characteristics of mmW beams dictate this design because they are less capable of penetrating and bouncing off solid objects than bands below 5 GHz.¹¹ A second transmitting source – a signal booster – emitting energy at some random location may jeopardize the

⁸ *Id.* ¶ 52.

⁹ *Id.* ¶ 58.

¹⁰ *See id.* ¶ 25.

¹¹ *See, e.g.,* Rappaport, Theodore S., “Commentary: How 5G Technology Will Transform the Way We Live,” *The Marconi Society* (Apr. 18, 2018), <http://marconisociety.org/commentary-how-5g-technology-will-transform-the-way-we-live/>.

interference performance of the overall mmW equipment design. While the booster may improve the performance of the boosted signal, its emissions could degrade the performance of nearby mmW signals. Design changes to the NPS may be necessary to accommodate mmW spectrum in Consumer Signal Boosters. And since commercial mmW devices are just now being deployed, the industry should have more time to review the performance of mmW equipment in the field before deciding whether and how those bands could be incorporated into Consumer Signal Boosters.

For these reasons, the Commission should continue to consider adding spectrum bands to the Consumer Signal Booster framework through notice-and-comment rulemaking. Verizon supports bringing the benefits of Consumer Signal Boosters to users of other spectrum bands but also does not want to undercut those benefits by adding bands to equipment that may not be consistent with the NPS.

III. THE COMMISSION SHOULD STRENGTHEN LABELING AND REGISTRATION REQUIREMENTS FOR EMBEDDED SIGNAL BOOSTERS.

The Commission proposes to facilitate the distribution and use of Embedded Boosters by easing labeling requirements.¹² In making this proposal, the Commission points to the success of its Consumer Signal Booster regime and the difficulty of implementing labeling requirements for Embedded Boosters that may not be visible.¹³ But unless the Commission adopts additional safeguards for labeling and registration of Embedded Boosters, these changes may have the effect of making it more difficult for mobile providers to exercise the control over Embedded Boosters necessary to trace, identify, and disable boosters that behave badly, contrary to the 2013 industry-driven framework.

¹² See *Second FNPRM* ¶¶ 29-30.

¹³ See *id.* ¶ 26.

A. Proliferation of Embedded Signal Boosters May Disrupt Existing Protections for Wireless Networks.

The Commission expresses concern that its labeling requirements have “stymied” the use of Embedded Boosters in vehicles because a label affixed to the booster itself is not visible to the ultimate consumer.¹⁴ It has granted waivers of the labeling rule to certain automobile manufacturers for this reason¹⁵ and now seeks to modify its rules to allow alternative labeling for all Embedded Boosters.

Facilitating distribution of Embedded Boosters may significantly affect the ability of spectrum licensees to control (*i.e.*, trace, identify, and, if needed, disable) Consumer Signal Boosters, as required under the current rules. Manufacturers design Embedded Boosters for use in vehicles – automobiles, boats, etc. – which are mobile. Even if the vehicle seller gives the purchaser a notice detailing the Commission’s registration requirements, it is difficult for the purchaser of a vehicle with an Embedded Booster to identify the licensees with which to register. Registration within the vehicle’s “home” or typical location may not be effective once the vehicle travels tens of miles away. And if – for some reason – the Embedded Booster starts to cause interference, it is difficult for the network operator under the current rules to detect an interfering booster in a moving vehicle even if the user has registered the booster with that provider.

In addition, assuming the vehicle purchaser registers the Embedded Booster with a consenting provider, that provider’s consent becomes *de facto* “consent” for any other provider

¹⁴ *Id.*

¹⁵ *See, e.g.*, Letter to William K. Coulter, Counsel for Porsche Cars North America, Inc., from Roger S. Noel, Chief, Mobility Division, Wireless Telecommunications Bureau, FCC, “Request for Partial Waiver of Section 20.21(f) of the Rules” (Aug. 7, 2017) (see “Porsche Waiver Letter,” <https://www.fcc.gov/wireless/bureau-divisions/mobility-division/signal-boosters/signal-boosters-vehicles-waivers#block-menu-block-4>).

operating on the same frequency bands where the vehicle travels. In other words, a mobile provider that has not consented through registration to use of an Embedded Booster may still be affected by the use of the booster by a subscriber of a provider with which the booster is registered. Again, the second provider has little chance of locating the Embedded Booster if it happens to behave badly while the vehicle is within its service area because the booster is mobile and not registered with the second provider.

B. The Commission Must Adopt Effective Labeling Requirements for Embedded Boosters.

“[P]roper labeling ensures that consumers are well aware of the specific requirements that attach to their use of a Consumer Signal Booster.”¹⁶ The Commission should adopt meaningful labeling and registration rules for Embedded Boosters.

First, the Commission should adopt its proposal to require manufacturers of vehicles with Embedded Boosters to provide an “alternative advisory” to purchasers with the same information and notices currently required in Section 20.21(f)(1).¹⁷ Because the consumer generally cannot see a label attached to an Embedded Booster, the alternative advisory will ensure that the purchaser obtains the notices and other information necessary to register, operate, and disable the booster – at least at the point of sale.

Second, the Commission should require a label attached to the vehicle itself. While the Embedded Booster may not be a visible and therefore viable site for a stick-on label, the Commission should require – in addition to the alternative advisory material – manufacturers of vehicles with Embedded Boosters to attach a label with the information required by Section 20.21(f)(1) to a consumer-accessible location on the vehicle itself. For example, a label could be

¹⁶ 2013 Report and Order ¶ 45.

¹⁷ See Second FNPRM ¶¶ 29-30.

“attached” to an automobile on the inside jamb of the driver-side door, or on the inside of the glove compartment.

Paper and/or electronic copies of the “alternative advisory” are certainly useful to provide notice to purchasers of vehicles with Embedded Boosters. But these advisories are easily lost or misplaced over the lifetime of the vehicle. Attaching a label on or within the vehicle itself increases the likelihood that the purchaser will retain and have access to this important information regarding the Embedded Booster and the Commission’s operational requirements after the purchase date.

Manufacturers choose to include Embedded Boosters in the vehicles they sell and thereby become subject to the Commission’s Consumer Signal Booster requirements. The Commission thus has the authority to mandate the labeling necessary to ensure that consumers operate Embedded Boosters as intended within the Consumer Signal Booster framework – even if the Commission chooses to relax the 2013 labeling requirements. The Commission should take this opportunity not just to facilitate the use of Embedded Boosters in vehicles but also to adopt an improved mechanism for the purchaser’s access to, and retention of, the information on that label.¹⁸ The combination of the alternative advisory and a vehicle-attached label will best effectuate the Commission’s original regulatory requirements for Embedded Boosters.

¹⁸ The Commission should also encourage the initial purchaser of a vehicle with an Embedded Booster to retain and transfer the alternative advisories with the vehicle at the time of a subsequent sale of the vehicle. *See Second FNPRM* ¶ 32 (seeking comment on registration procedure after subsequent sale of vehicle). For example, the Commission could add language to an Embedded Booster advisory notice such as: “Pursuant to FCC rules, the owner of this vehicle is responsible for transferring the advisories regarding regulatory and use requirements for the Consumer Signal Booster to any person who obtains the ownership rights to this vehicle from such owner.”

C. The Commission Should Expand the Registration Requirements for Embedded Boosters.

The current registration requirements for Consumer Signal Boosters were designed primarily for boosters in fixed locations. To maintain the necessary protections against harmful interference as it facilitates the use of mobile signal boosters, the Commission should expand the information required to register Embedded Boosters.

For any Consumer Signal Booster embedded in a vehicle, the Commission should require the purchaser to include in its registration (i) the make and (ii) model of the vehicle, (iii) the manufacturer-supplied Vehicle Identification Number and, if any, (iv) the government-issued license plate number, and add these data points to Section 20.21(h). This information should be readily available to the consumer at the time of purchase or soon thereafter.

Expanding the registration information strengthens the Commission's existing requirements because it identifies the booster as a mobile device and provides details that may be useful in tracking the vehicle and booster, if necessary, when it is traveling away from the owner's home address. The current registration requirements provide little information to help identify mobile boosters while traveling. As the Commission recognized, "wireless licensee knowledge, control and consent are critical to ensuring that signal boosters do not interfere [with wireless networks], or if they do, to resolving that interference."¹⁹ The expanded registration information for Embedded Boosters helps achieve this goal.

D. The Commission Should Encourage Manufacturers and Their Agents to Help Consumers Register Embedded Boosters at Point of Sale.

As the Commission takes steps to increase the distribution of Embedded Boosters by easing labeling requirements, it should also consider how best to accomplish the registration of

¹⁹ 2013 Report and Order ¶ 26 (quoting Comments of Verizon Wireless, WT Docket No. 10-4, at v (filed July 25, 2011)).

Embedded Boosters. Requiring manufacturers to facilitate each Embedded Booster's registration at point of sale as a condition of the sale of the booster to the consumer would greatly improve the Commission's registration procedure.

Point of sale is the ideal time for a user to register an Embedded Booster. The information necessary for registration is available at that time in one place. And the manufacturer or its distributor-agent should be familiar with the registration process and could walk purchasers through registration on their provider's and other providers' mobile networks.

Manufacturers can also adopt policies that encourage registration at the time of sale. For example, they could include partial rebates on the cost of the booster for each registration completed on the day of sale. Point of sale registration would likely increase the instances of registration, consistent with the overall Consumer Signal Booster framework.

IV. THE COMMISSION SHOULD STRENGTHEN LICENSEE CONTROL OVER WIDEBAND SIGNAL BOOSTERS.

The Commission seeks to follow the elimination of the "personal use" restriction on Provider-Specific Signal Boosters by eliminating the same restriction on Wideband Signal Boosters.²⁰ The Commission expects this change to allow enterprise customers to take advantage of the benefits of both Provider-Specific and Wideband Boosters.²¹

Wideband Boosters pose more of a threat to wireless networks than Provider-Specific Boosters because they can be used with multiple provider networks, and consumers may encounter difficulty in registering them with all potentially affected networks. The Commission should therefore consider a new registration process to encourage consumers to register and to facilitate licensees' access to registration information.

²⁰ See *Second Report and Order* ¶¶ 13-16.

²¹ See *Second FNPRM* ¶ 34.

A. Increasing Enterprise Use of Wideband Boosters Poses Greater Risks of Use without Registration.

Lifting the personal use restriction on Wideband Boosters raises the twin challenges of encouraging users to register with a mobile operator who is not their mobile service provider and to register with multiple such operators. As the Commission recognizes, without the personal use restriction, a Wideband Booster could be placed into service by a consumer with no relation to the mobile provider. Registration of non-subscribers raises substantial concerns because there is little incentive for consumers to register with multiple providers.²²

In addition, the expanded use of Wideband Boosters exacerbates the problems identified above for Embedded Boosters. To appeal to a broad customer base, a manufacturer is more likely to install a Wideband Booster than a Provider-Specific Booster in a vehicle. While a consumer may only use the booster with one provider, the Commission's proposed rules – if adopted – would allow vehicle owners to use a Wideband Booster with multiple providers.²³ Imagine a fleet of trucks with multiple potential drivers, each of whom subscribes to a different mobile service provider. Registering the mobile boosters in a fleet of trucks with all the appropriate service providers could be a daunting, if not impossible, task.

B. The Commission Should Host an Online Database for Registration of Wideband Consumer Signal Boosters.

The Commission proposes to require Wideband Booster users to register and receive consent from all affected mobile providers, and for the Commission to offer an online database to assist registrants in identifying operators.²⁴ Registration is designed for a critical goal: to “facilitate rapid resolution of interference, if it occurs.”²⁵ But there is little incentive in the

²² See *id.* ¶¶ 43-44.

²³ See *id.*

²⁴ See *id.* ¶¶ 47-49.

²⁵ 2013 Report and Order ¶ 97.

Commission’s proposal for Wideband Booster users actually to register with multiple wireless providers to facilitate addressing interference issues.

Rather than offering an online database of mobile operators and their locations for consumers, the Commission should host an online registry and database for Wideband Boosters, accessible by all mobile operators. The same information required by Section 20.21(h) should be included in the online database. A central registry would allow for one-time registration of a Wideband Booster, without the need for the user to research which operators to register with and then register with multiple operators.

The central database should be accessible and searchable by all mobile operators.²⁶ A mobile operator would then have a known source to search for Wideband Boosters that may be behaving badly on its network – even if the user would never have registered the booster on that provider’s network. And the Commission could deem mobile operators to have consented to the use of the booster and to maintain “control” of the booster when operating on their networks, by agreeing that Wideband Booster users can register on the central database.²⁷

Given the concerns with registering Wideband Boosters with multiple licensees, the Commission should not lift the personal use restriction on Wideband Boosters until it has implemented the online registry described above and the registry is accessible and usable by consumers and mobile operators.

²⁶ If they choose, consumers could still register Wideband Boosters with their personal service provider. And the Commission could allow mobile operators to opt out of the central database and require Wideband Booster users to register with their individual networks. The Commission could identify those operators on the registry homepage to alert consumers to those requirements.

²⁷ This registration procedure mirrors the procedure originally adopted by the Commission. The signal booster users must obtain consent from mobile operators through registration of the signal boosters. “Our blanket licensing approach ensures that subscribers operate signal boosters with their providers’ knowledge and under their providers’ control.” *2013 Report and Order* ¶ 29.

V. CONCLUSION.

The Commission should adopt the rules and policies described above to ensure that its Consumer Signal Booster rules continue to protect wireless networks and subscribers from harmful interference.

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